We claim:-

1. a process for the catalytic gas-phase oxidation of propene to acrylic acid, in which a reaction gas starting mixture 1 which contains propene, molecular oxygen and at least one inert gas, comprising at least 20% by volume of molecular nitrogen, and which contains the molecular oxygen and the propene in a molar $O_2:C_3H_6$ ratio of $\geq$ 1 is first passed, in a first reaction stage at elevated temperatures, over a first fixed-bed catalyst, whose active material is at least one multimetal oxide containing molybdenum and/or tungsten and bismuth, tellurium, antimony, tin and/or copper, in such a way that the propene conversion in a single pass is $\geq$ 90 mol% and the associated selectivity of the acrolein formation and of the acrylic acid byproduct formation together is $\geq$ 90 mol%, the temperature of the product gas mixture leaving the first reaction stage is, if required, reduced by indirect and/or direct cooling and, if required, molecular oxygen and/or inert gas are/is added to the product gas mixture, and the product gas mixture, as reaction gas starting mixture 2 which contains acrolein, molecular oxygen and at least one inert gas, comprising at least 20% by volume of molecular nitrogen, and which contains the molecular oxygen and the acrolein in a molar $O_2:C_3H_4O$ ratio of $\geq$ 0.5, is then passed, in a second reaction stage at elevated temperatures, over a second fixed-bed catalyst whose active material is at least one molybdenum- and vanadium-containing multimetal oxide, in such a way that the acrolein conversion in a single pass is $\geq$ 90 mol% and the selectivity of the acrylic acid formation balanced over both reaction stages is $\geq$ 80 mol%, based on propene converted, wherein

a) the loading of the first fixed-bed catalyst with the propene contained in reaction gas starting mixture 1 is $\geq$ 160 l(S.T.P.) of propene/l of catalyst bed · h,

b) the first fixed-bed catalyst consists of a catalyst bed arranged in two spatially successive reacton zones A,B, the temperature of reaction zone A being from 300 to 390°C and the temperature of reaction zone B being from 305 to 420°C and at the same time at least 5°C above the temperature of reaction zone A,

c) the reaction gas starting mixture 1 flows first through reaction zone A and then through reaction zone B,

d) the reaction zone A extends to a propene conversion of from 40 to 80 mol%,

e) the loading of the second fixed-bed catalyst with the acrolein contained in reaction gas starting mixture 2 is $\geq$ 140 l(S.T.P.) of acrolein/l of catalyst bed · h,

f) the second fixed-bed catalyst consists of a catalyst bed arranged in two spatially successive reaction zones C,D, the temperature of reaction zone C being from 230 to 270°C and the temperature of reaction zone D being from 250 to 300°C and at the same time at least 5°C above the temperature of reaction zone C,

g) the reaction gas starting mixture 2 flows first through reaction zone C and then through reaction zone D and

h) the reaction zone C extends to an acrolein conversion of from 55 to 85 mol%.

2. A process as claimed in claim 1, wherein the reaction zone A extends to a propene conversion of from 50 to 70 mol%.

3. A process as claimed in claim 1, wherein the reaction zone A extends to a propene conversion of from 65 to 75 mol%.

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4. A process as claimed in any of claims 1 to 3, wherein the reaction zone C extends to an acrolein conversion of from 65 to 80 mol%.

5. A process as claimed in any of claims 1 to 4, wherein the temperature of the reaction zone B is at least 10°C above the temperature of the reaction zone A.

6. A process as claimed in any of claims 1 to 5, wherein the temperature of the reaction zone D is at least 20°C above the temperature of the reaction zone C.

7. A process as claimed in any of claims 1 to 6, wherein the temperature of the reaction zone B is from 305 to 340°C.

8. A process as claimed in any of claims 1 to 6, wherein the temperature of the reaction zone B is from 310 to 330°C.

9. A process as claimed in any of claims 1 to 8, wherein the temperature of the reaction zone C is from 245 to 260°C.

10. A process as claimed in any of claims 1 to 8, wherein the temperature of the reaction zone D is from 265 to 285°C.

11. A process as claimed in any of claims 1 to 10, wherein the propene conversion in a single pass in the first reaction stage is $\geq$ 94 mol%.

12. A process as claimed in any of claims 1 to 11, wherein the selectivity of the acrolein formation and of the acrylic acid byproduct formation together in a single pass in the first reaction stage is $\geq$ 94 mol%.

13. A process as claimed in any of claims 1 to 12, wherein the acrolein conversion in a single pass in the second reaction stage is $\geq$ 94 mol%.

14. A process as claimed in any of claims 1 to 13, wherein the selectivity of the acrylic acid formation balanced over both reaction stages is $\geq$ 85 mol%, based on propene converted.

15. A process as claimed in any of claims 1 to 14, wherein the propene loading of the first fixed-bed catalyst is $\geq$ 165 l(S.T.P.)/l · h.

16. A process as claimed in any of claims 1 to 15, wherein the propene loading of the first fixed-bed catalyst is $\geq$ 170 l(S.T.P.)/l · h.

17. A process as claimed in any of claims 1 to 16, wherein the at least one inert gas contained in the reaction gas starting mixture 1 comprises $\geq$ 40% by volume of molecular nitrogen.

18. A process as claimed in any of claims 1 to 16, wherein the at least one inert gas contained in the reaction gas starting mixture 1 comprises $\geq$ 60% by volume of molecular nitrogen.

19. A process as claimed in any of claims 1 to 18, wherein the at least one inert gas contained in the reaction gas starting mixture 1 comprises steam.

20. A process as claimed in any of claims 1 to 19, wherein the at least one inert gas contained in the reaction gas starting mixture 1 comprises CO_2 and/or CO.

21. A process as claimed in any of claims 1 to 20, wherein the propene content of the reaction gas starting mixture 1 is from 4 to 15% by volume.

22. A process as claimed in any of claims 1 to 21, wherein the active material of the first fixed-bed catalyst is at least one multimetal oxide of the formula I

$$Mo_{12}Bi_aFe_bX^1_cX^2_dX^3_eX^4_fO_n \quad (I)$$

where

X^1 is nickel and/or cobalt,
X^2 is thallium, an alkali metal and/or an alkaline earth metal,
X^3 is zinc, phosphorus, arsenic, boron, antimony, tin, cerium, lead and/or tungsten,
X^4 is silicon, aluminum, titanium and/or zirconium,
a is from 0.5 to 5,
b is from 0.01 to 5,
c is from 0 to 10,
d is from 0 to 2,
e is from 0 to 8,
f is from 0 to 10 and
n is a number which is determined by the valency and frequency of the elements other than oxygen in I.

23. A process as claimed in any of claims 1 to 21, wherein the active material of the first fixed-bed catalyst is at least one multimetal oxide of the formula II

$$[Y^1_{a'}Y^2_{b'}O_{x'}]_p[Y^3_{c'}Y^4_{d'}Y^5_{e'}Y^6_{f'}Y^7_{g'}Y^2_{h'}O_{y'}]_q \quad (II),$$

where

Y^1 is bismuth, tellurium, antimony, tin and/or copper,
Y^2 is molybdenum and/or tungsten,
Y^3 is an alkali metal, thallium and/or samarium,
Y^4 is an alkaline earth metal, nickel, cobalt, copper, manganese, zinc, tin, cadmium and/or mercury,
Y^5 is iron, chromium, cerium and/or vanadium,
Y^6 is phosphorus, arsenic, boron and/or antimony,

Y^7	is a rare earth metal, titanium, zirconium, niobium, tantalum, rhenium, ruthenium, rhodium, silver, gold, aluminum, gallium, indium, silicon, germanium, lead, thorium and/or uranium,
a'	is from 0.01 to 8,
b'	is from 0.1 to 30,
c'	is from 0 to 4,
d'	is from 0 to 20,
e'	is from 0 to 20,
f'	is from 0 to 6,
g'	is from 0 to 15,
h'	is from 8 to 16,
x',y'	are numbers which are determined by the valency and frequency of the elements other than oxygen in II and
p,q	are numbers whose ratio p/q is from 0.1 to 10,

containing three-dimensional regions which are delimited from their local environment as a result of their composition differing from their local environment and have the chemical composition $Y^1_{a'}Y^2_{b'}O_{x'}$ and whose maximum diameters are from 1 nm to 100 µm.

24. A process as claimed in any of claims 1 to 23, wherein the first fixed-bed catalyst comprises annular and/or spherical catalysts.

25. A process as claimed in claim 24, wherein the ring geometry is the following:

external diameter:	from 2 to 10 mm,
length:	from 2 to 10 mm,
wall thickness:	from 1 to 3 mm.

26. A process as claimed in claim 24, wherein the spherical catalyst is a coated catalyst consisting of a spherical support (from 1 to 8 mm diameter) and a coat of active material applied thereon (from 10 to 1000 µm thick).

27. The process as claimed in any of claims 1 to 26, wherein the first and the second reaction stages are each carried out in a two-zone tube-bundle reactor.

28. A process as claimed in any of claims 1 to 27, wherein the active material of the second fixed-bed catalyst is at least one multimetal oxide of the formula IV

$$Mo_{12}V_aX^1_bX^2_cX^3_dX^4_eX^5_fX^6_gO_n \quad \text{(IV)}$$

where

X^1 is W, Nb, Ta, Cr and/or Ce,
X^2 is Cu, Ni, Co, Fe, Mn and/or Zn,
X^3 is Sb and/or Bi,
X^4 is one or more alkali metals,
X^5 is one or more alkaline earth metals,
X^6 is Si, Al, Ti and/or Zr,
a is from 1 to 6,
b is from 0.2 to 4,
c is from 0.5 to 18,
d is from 0 to 40,
e is from 0 to 2,
f is from 0 to 4,
g is from 0 to 40 and
n is a number which is determined by the valency and frequency of the elements other than oxygen in IV.

29. A process as claimed in any of claims 1 to 27, wherein the active material of the second fixed-bed catalyst is at least one multimetal oxide of the formula VI

$$[D]_p[E]_q \quad \text{(VI)},$$

where

D is $Mo_{12}V_{a''}Z^1_{b''}Z^2_{c''}Z^3_{d''}Z^4_{e''}Z^5_{f''}Z^6_{g''}O_{x''}$,
E is $Z^7_{12}Cu_hH_{i''}O_{y''}$,
Z^1 is W, Nb, Ta, Cr and/or Ce,
Z^2 is Cu, Ni, Co, Fe, Mn and/or Zn,
Z^3 is Sb and/or Bi,
Z^4 is Li, Na, K, Rb, Cs and/or H,
Z^5 is Mg, Co, Sr and/or Ba,
Z^6 is Si, Al, Ti and/or Zr,
Z^7 is Mo, W, V, Nb and/or Ta,

a″ is from 1 to 8,
b″ is from 0,2 to 5,
c″ is from 0 to 23,
d″ is from 0 to 50,
e″ is from 0 to 2,
f″ is from 0 to 5,

g″ is from 0 to 50,
h″ is from 4 to 30,
i″ is from 0 to 20 and
x″,y″ are numbers which are determined by the valency and frequency of the elements other than oxygen in VI and
p,q are numbers other than zero whose ratio p/q is from 160:1 to 1:1,

which is obtainable by separately preforming a multimetal oxide material (E)

$$Z^7_{12}Cu_{h''}H_{i''}O_{y''} \quad (E)$$

in finely divided form (starting material 1) and then incorporating the preformed solid starting material 1 into an aqueous solution, an aqueous suspension or a finely divided dry blend of sources of the elements Mo, V, Z^1, Z^2, Z^3, Z^4, Z^5, Z^6, which contains the abovementioned elements in the stoichiometry D

$$Mo_{12}V_{a''}Z^1_{b''}Z^2_{c''}Z^3_{d''}Z^4_{e''}Z^5_{f''}Z^6_{g''} \quad (D)$$

(starting material 2), in the desired ratio p:q, drying any resulting aqueous mixture, and calcining the dry precursor material thus obtained, before or after it has been dried, at from 250 to 600°C to give the desired catalyst geometry.

30. A process as claimed in any of claims 1 to 29, wherein the second fixed-bed catalyst comprises annular catalysts.

31. A process as claimed in any of claims 1 to 29, wherein the second fixed-bed catalyst comprises spherical catalysts.